A7 Assignment – ESE516-SPRING 2019

DUE DATE: Thursday April 18th 2019 before 11:59pm EST (By almost midnight). To be submitted on Google Drive ON THE FOLDER OF YOUR TEAM!
Remember: Please submit your complete Altium Project on Google Teams, on a folder called A7. The project must be complete (must have everything so we can compile it!).

1.) Creating the Node-Red dashboard for your project [100 points]

- Review the tutorial of Lecture 20 to understand how to create a Node Red Instance as well as how to link it to your MQTT Broker.
- Define ALL the messages that your system will need. FOR EACH ONE OF THEM list the following:
    - MQTT TOPIC
    - Type (String? Boolean? Number?)
    - Define a JSON structure on how you mean to send the data
    - Is it a message from the device to the cloud, or from the cloud to the device?
    - What does the data do? What does it activate? Is it the reading of a certain sensor?

  To turn in: A word document explaining ALL the messages you need for your final project.

- Draw a flow diagram for your main application. Determine what happens when certain messages are received, and what activates the sending of messages from the device to the cloud.
  To turn in: A word document showing the flow diagram of your project, showing what happens when messages are received and what happens when they are sent.

- Design a dashboard on another tab for your project – Add all the necessary Node-Red block to handle the data you expect to receive in your project and show it to the user (it could be gauges, text messages, buttons, charts, etc.).

  To turn in: A word document showing the Node-Red diagram of your project, and the User Interface (dashboard). Also attach a link to your dashboard.

- Do a Node-Red dashboard to simulate your device sending data to your project's dashboard – follow the same simulation method use on the example of the L20 lecture tutorial.

  To turn in: A word document showing the Node-Red diagram of your project (simulator), and the User Interface (dashboard). Also attach a link to your dashboard.

- Check that the simulator you made correctly exercises the Dashboard of your final project.

2.) Downloading a New Firmware Version of the Main Application and doing an OTAFU [100 points]

- Add a button to your Dashboard that orders your device to start an OTAU.
- Modify the A7 Starter code to subscribe to this new OTAU topic and start a download of the new binary file.
- Further modify the example project and add the bootloader you made on A6. Demonstrate that the bootloader can successfully get the file downloaded in the previous step and perform an OTAFU

  To Hand In: Upload a video that demonstrates that you can successfully do an OTAFU on your System

3.) Simulating your project on the SAMW25 Xplained board with the CLI [200]

- Integrate the CLI you made on project A1 into the A7 Starter code.
- Add any ASF Module that you will use on your final project. For example, if you have an I2C sensor, add the I2C library.
- Modify the A7 starter code to be able to send data to the topics you defined, and to be able to receive data from the topics you defined.
- Make a CLI command **for each topic** in which you can send simulation data to the cloud and are able to see your dashboard show the information.
- For each data from the Dashboard into your system make it print the data received AND the action to take
- Verify that you are able to:
    - Send data for each message defined from the MCU to the Node-Red dashboard
    - Receive data for each message from the Node-Red to the MCU and display the action the MCU would take with that data

To Hand in: Complete project in a zip file in your A7 Google Drive Folder.